SNC Reference Number (enter if previously assigned)
SNC 080166

PROJECT SUMMARY

County:

Applicant: David Cooper, PhD

Project Title: Condition assessment and restoration needs for montane meadows in the Sierra Nevada, California

PROJECT GOAL

Our goals are to understand (1) the current ecological and hydrologic condition of Sierra meadows, and (2) whether impacted meadows are recovering from the legacy grazing or whether they now exist in an ecologically and hydrologically altered stable state. This information can guide meadow assessments and restoration planning for the future. This proposal addresses the need to determine the condition of meadows today, in comparison to their historic condition. If we find that many meadows are modified from their original condition, and are not recovering, we will propose a Phase 2 proposal to develop and implement restoration methods.

PROJECT SCOPE

We propose to assess the ecological and hydrologic characteristics of a random sample of meadows in the Sierra Nevada. Our work would provide new concepts about the condition and long-term ecological status of meadows, and help set goals for restoration, if needed. If we find that many meadows are in need of restoration, we will follow up with a second phase restoration project proposal.

From our existing meadow data sets we will identify meadows with and without the long-lived clonal and bunch sedges and grasses that we hypothesize to have been the dominant vegetation in meadows prior to the legacy grazing. We will randomly select 7 meadows with and 7 meadows without dominance by long lived plants in the northern and an equal number from the southern Sierra Nevada. We will use Yosemite National Park as our north-south Sierra dividing line, and will also analyze Tuolumne Meadows in Yosemite, for a total of 29 meadows. Within each meadow we will analyze the hydrologic regime, water storage, present and past vegetation composition, and determine whether the soils are losing organic matter on an annual basis.

In each study meadow we will establish ground water monitoring wells to measure water table depth, and calculate summer water storage. We will collect data on the current floristic composition, and canopy coverage of each plant species in plots. We will determine peak annual standing crop and root production using clipped plots and in-growth cores. We will collect soils cores from each plot, and using soil seed bank (viable seeds stored in the soil), macrofossils such as seeds, stems and other identifiable plant parts, and phytoliths (opals formed within plant cells and deposited in the soil when plants die) determine the composition of the vegetation in soil layers that represent different periods in the past. Soil layers will be aged using ^{210}Pb and ^{14}C dating. We will determine if there has been a vegetation change over the past 200 years, and if so, what species occurred prior to and following changes. We will measure net ecosystem carbon exchange at key points during the summer to determine whether soils are gaining or losing organic matter on an annual basis.

These data will be used to present an analysis of whether many Sierra meadows currently exist in an altered stable state, and determine the condition of that state today compared with pre-disturbance vegetation and soil carbon. We will use these data to provide methods for analyzing meadows to determine their ecological state. We will also develop restoration perspectives, including the desired future condition of

meadows, with specific recommendations for reestablishing suitable plant species, and specific monitoring goals.

LETTERS OF SUPPORT

SNC PROJECT DELIVERABLES AND SCHEDULE

DETAILED PROJECT DELIVERABLES	TIMELINE
INCLUDE SPECIFIC TASKS IDENTIFIED IN SCOPE AND ALL REPORTS, ETC.	ASSUME START DATE 60 DAYS AFTER SNC BOARD AUTHORIZATION
Identify study sites	Year 1
Establish monitoring wells and plots	Year 1
Collect cores for paleoecology	Year 1
Quantify CO_2 flux	Years 1 and 2
Quantify ANPP and BNPP	Years 1 and 2
Quantify species composition/coverage	Years 1 and 2
Continue monitoring wells and plots	Years 1 and 2
Data analysis and synthesis	Year 2
Report production and presentations	Year 2

SNC PROJECT COSTS

PROJECT BUDGET CATEGORIES	TOTAL SNC FUNDING
INCLUDE COSTS FOR STAFF, TASKS, DELIVERABLES AND PROJECT PERFORMANCE MEASURES	$
Salary for PI, Graduate student and staff	$80,924
Fringe benefits at 24.4%, 4.3% and 24.4%	$11,401
Tuition for graduate student for 2 semesters per year	$11,524
Materials and supplies: pvc pipe, fence materials, trays, jars	$1,050
Contract Services: Phytolith analysis, 14C AMS aging	$14,100
Travel: Airline to and from CA, vehicle mileage, housing, professional meetings	$18,400
Subcontract to Michigan Tech University, Rod Chimner	$108,429
	$
	$
SNC GRANT TOTAL	**$245,828**